

Remarks

- 1) Applicant thanks the Examiner for his well considered office action and hopes that this response will further the understanding of applicant's invention.
- 2) Claims 1, 5- 8, 11-14, 19-20, and 22-27 have been amended and are pending in the application. Claims 2, 9,-0, and 28 are pending as originally presented. Claims 3-4, 15, 17, 18, 21, and 19 have been canceled.
- 3) The specifications and abstract have been amended in accordance with the Examiner's remarks.
- 4) Claims 5, 23, and 26 were objected to by the Examiner for informalities consisting of typographical errors. Applicant regrets the informalities and typographical errors that were discovered by the Examiner and thanks the Examiner for her attention. The claims in question have been corrected.
- 5) Claims 1, 6. and 26 stands rejected under 35 U.S.C. §112, for lacking antecedent basis for elements of the claim. The claims were amended to replace the phrases in question with elements having antecedent basis. Applicant thanks the Examiner for noticing those errors, and respectfully requests that the rejection be reconsidered and withdrawn.
- 6) The limitations of claims 3 and 4 were incorporated within independent claim 1. The limitations of claim 15 were incorporated within independent claim 14. Claim 21 limitations were incorporated into claim 20.
- 7) The present invention overcomes the problems of the prior art rock bolt installation arrangements by eliminating intensive labor and costs of the installation. More particularly the invention provides an improved method and associated apparatus for installing and anchoring self drilled rock bolts by **using an improved resin delivery system in which resin grout delivery passages are not susceptible to clogging**. As indicated on page 5 of the specification, a resin grout such as a mastic and a catalyst which form a grouting compound are injected from the drill head through an internal cavity of the bolt whereupon the mastic and catalyst mix to form the compound. The grouting compound exits the bolt cavity at a distal end and flows into a space between the rock bolt and the wall of a hole in which the rock bolt is inserted. One of the advantages of the invention compared to the prior art methodology is that since the compound cures in a matter of seconds, anchorage is achieved

very quickly. In the prior art, grouting cement is inserted in the cavity space between the rock bolt and the wall of the rock in which the bolt is to be inserted but curing can take several hours. This requires the installation to be monitored until curing thereby increasing the labor and cost component.

- 8) The arrangement disclosed by Standish (US 5,374,140) includes the use of liquid cement nipples 18 which introduce a liquid cement, however applicant failed to find in the Standish reference any teachings relating to the limitation requiring for retaining and delivering to the rock **bolt individual materials of a grouting compound**, to be kept separated until mixed in the bore, as required by amended claims 1 and 14. Moreover, Standish does not disclose concentric passages as claimed for example in independent claims 14, 19, and 24, or that are not in axial alignment with the internal cavity of the rock bolt as claimed in independent claims 24 and 27.
- 9) Standish does not teach this sophisticated and efficient arrangement where the injection nozzle cuts off the flushing flow, as claimed in claim 6. In Standish the provision of liquid cement nipples on liquid cement swivel 14 is a substantially different arrangement without mutual co operation between the flushing fluid supply and the sequential grouting compound injections as claimed in claim 12 for example. In Standish, the respective supply of flushing fluid and grouting compound are mutually separate and independent. Also, it is far more efficient to use a resin and when that choice is made, a new means for delivery of that compound must be devised. Even in the case of disclosure of the use of resins as a grouting compound, 9 such as in Standish et al. (US 5,374,140) the prior art does not teach the specific arrangements of the drill head and bolt interaction and the way the grouting is introduced into the bolt.
- 10) Standish does not teach the limitation of concentric passages in the drill head, as claimed for example in claims 4, 14, 17, 19, 20, 23, and 24, as amended. The concentric arrangement of the passages allows those embodiments of the present invention to provide good mixing of the grouting compound elements, and ease of automated control of the various fluid flows as described.

- 11) Inasmuch as the Examiner may still consider the Standish reference to have bearing on the claims as amended, applicant submits the additional argument that Standish is directed to a drillable ground support bolt and a method for its installation, and is not directed to a drill head. Applicant respectfully submits that a drill head is a term well known in the art, and further described in the specifications as "... several drill rods together and pass them through the drilling head on the drilling machine. In this application an offset drive head may be used where the drive head is hollow and is offset from the main drilling motor itself. The offset drive head is normally driven by a gear system or by a chain from the drill motor." As the Standish reference is directed to the bolt and its installation, the description provided by the reference is not enabling of a drill head. Standish does describe a 'converter drive' (col. 3, ll. 54-68), which is described as a necessary part to adapt the invention to conventional drills. The converter drive arrangement of the Standish citation simply accommodates prior art methods wherein the grouting material is introduced through an opening which is not directly in communication with a drill head, but with the converter drive disclosed. The present invention should be seen in the context of the co operation between the bolt and the drill head as claimed, which is neither described, nor hinted by Standish et al. Aspects of this co operation enables the head to allow fluid to pass through flushing fluid passages and when the grouting compound is to be introduced, a nozzle on the grouting compound passages closes off the fluid passages, and good mixing of the grouting compound elements by using concentric passages, as well as the prevention of clogging discussed above, none of which is disclosed by Standish.
- 12) Claims 1-4, 14, 17-20, 22-24 and 27-28 stand rejected as being anticipated by Standish et al (after the cancellation of claim 21). Applicant respectfully submits that due to the reasons discussed above, the Standish disclosure does not teach the combination or method aspects of the present invention as reflected by the amended claims. Therefore, applicant respectfully requests that the rejection be reconsidered and withdrawn.
- 13) Claims 5 and 6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Standish in view of Lane (US 4, 655, 644). Applicant respectfully submits that contrary to Examiner's assertion, Standish does not disclose an injection assembly

that shuts off the water during injection of grouting material. It would be clear that the injection assembly disclosed by Standish allows continued water flow through the bore 17, as well as liquid cement flow through liquid cement nipples 18, and swivel 14. While Standish discloses switching off the water and starting the flow of liquid cement (col. 4, ll. 33-35), there is no indication of usage of the injection nozzle to perform this function.

14) That Lane patent teaches a binder injecting rockbolt having a cavity and which have a sleeve and mating connections for attachment to an adjacent sleeve. The rockbolt has a sleeve and a central member to provide strength, and a top section having an outlet port and a bottom section having an inlet port to allow injection of a binder. The bolts are manufactured and stored in sections. The present invention teaches a **drill head** which works in conjunction with a rock bolt having an internal cavity and which can deliver to the bolt a grouting compound which is mixed as it travels along the cavity in the bolt. The drill head introduces the grouting compound into the bolt but keeps the constituents of the compound separate until they enter the bolt cavity. Lane does not teach, nor suggests, the drill head assembly of the present invention. Some of the features disclosed in Lane can be found in the present invention but not the combination now claimed in the amended claims. Lane is directed to a hollow rockbolt, without any mention of self drilling rockbolt. While Lane discloses an installer unit, the operation of the drilling is completely separate from the rockbolt insertion and the filling of the hole with grouting material. Therefore, the application of Lane to the drill head with a spindle to spin the bolt, and an injection assembly is far from obvious, as Lane teaches away from the integrated machine for drilling/flushing/grouting disclosed in the present invention. Neither the Lane reference nor the Standish reference are directed to a drill head, and therefore their combination does not disclose all the limitations as disclosed and claimed in the present invention.

15) Additionally, Lane specifically provides that the binder components "travel together through passage 40 into annular chamber 28" (col. 7, ll. 31-32). Clearly, the lane invention teaches away from the constructs of various claims which require the separate elements of the grouting compound to be mixed

only in the cavity within the bolt, not in a separate passage that will be susceptible to frequent clogging.

- 16) Applicant further submits that as the independent claim upon which claims 5 and 6 depend have been shown patentable, claims 5 and 6 are also allowable.
- 17) Inasmuch as the Examiner may still find the combination of the Standish and Lane reference material to the present invention, applicant respectfully presents the argument that lane is directed to binder injecting rockbolt, and Standish is directed to a self drilling rock bolt. While both are in the wide field of ground supporting bolts, the references are directed to different directions in the field, and operate to perform different functions in different ways, to achieve different results, wherein Lane et al. is directed to a bolt allowing binder injection, and Standish being directed to self drilling bolt. It is noted that as Standish uses a hollow bolt to inject grouting material therethrough as suggested by Lane et al., however neither Lane nor Standish which uses a Lane like construction teach or even a hint of desirability or motivation to combine the two references. Applicant further respectfully submits that even if the teachings of the Standish and Lane references are "completely compatible and consistent" such compatibility and consistency does not rise to the level of a suggestion to a motivation to combine the references as required. "When an obviousness determination relies on the combination of two or more references, there must be some suggestion or motivation to combine the references." See In re Rouffet, 149 F.3d 1350, 1355, 47 USPQ2d 1453, 1456 (Fed. Cir. 1998) and "When determining the patentability of a claimed invention which combines two known elements, 'the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.'" In re Beattie, 974 F.2d 1309, 1311-12, 24 USPQ2d 1040, 1042 (Fed. Cir. 1992). As no such motivation to combine exists in the prior art as a whole, applicant respectfully submits that the Examiner erred and used impermissible hindsight to pick and chose elements from the Standish and from the Lane references to recreate the present invention.
- 18) Claims 7-13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Standish et al. as modified by Lane et al. and further in view of Rolston (US 4,289,427).

- 19) Applicant believes that the above argument shows the combination of Standish and Lane is applicable to the rejection of the claims in question. Additionally, the Examined alleges that the Rolston reference teaches the use of two concentric passages 26 shown in Fig. 2. Applicant respectfully refers the Examiner to Rolston's text at col. 2 ll. 56-63, wherein the bonding agent injection mechanism is described. Passages 26 are described as a plurality of passages in face plate 27. Nowhere in Rolston do those passages, or any other passages used for passage of a bonding agent are described as concentric. Thus, the references fail to teach, individually or in combination, the limitations of the claimed invention.
- 20) Furthermore, Rolston relates to inserting a cable in whole pre-drilled in a roof, and not inserting a drill head as in the present invention, and thus Rolston has little if any bearing on the present invention. Furthermore, as Rolston is directed to a process including "drilling a hole into the roof and THEN inserting a multi stranded cable into the hole" (abstract) and not to a self drilling, drillable ground support bolt as in the Standish reference, or to a binder injecting rockbolt, applicant respectfully submits that the combination of Rolston with Standish and Lane comprise an impermissible combinations of dissimilar fields of art. Additionally, there is no suggestion or motivation to combine Rolston with either Lane or Standish, and such a combination constitutes an impermissible combination as shown above. .
- 21) Claims 15 and 16 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Standish in view of Rolston et al. The Examiner alleges that the Rolston reference teaches the use of two concentric passages 26 shown in Fig. 2. Applicant respectfully refers the Examiner to Rolston's text at col. 2 ll. 56-63, wherein the bonding agent injection mechanism is described. Passages 26 are described as a plurality of passages in face plate 27. Nowhere in Rolston do those passages, or any other passages used for passage of a bonding agent are described as concentric. Thus, the references fail to teach, individually or in combination, the limitations of the claimed invention.
- 22) Claims 25 and 26 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Standish et al. as applied to claim 24, in view of Lane et al. As *inter alia* Lane specifically teaches away from limitation 'g' of independent amended claim 24

requiring the introduction of separate materials of a grouting compound from concentric passages. Applicant respectfully submits that the application of Standish to claim 24 has also been shown to be inappropriate, especially in light of the amendments made to the claim.

- 23) Other dependent claims are allowable as incorporating all limitations of the independent claims, as amended.
- 24) Applicant has made a good faith effort to address each and every point made by the Examiner, and amended the claim and the specifications in order to place the application in condition for allowance. Should the Examiner find any deficiency in this amendment or in the application, or should the Examiner believe for any reason, that a conversation with applicant's agent may further the allowance and issuance of this application, the Examiner is kindly requested to contact Shalom Wertsberger at telephone (207) 799-9733.

In light of the showing and all other reasons stated above, applicant believes that the rejections and objections presented by the Examiner in the office action mailed to applicant January 31st 2003 were overcome. Applicant therefore submits that the claims as amended are in condition for allowance. Reconsideration and withdrawal of the rejection and issue of a notice of allowance on all pending claims is respectfully solicited.

Respectfully submitted



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